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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

TECHNICAL MEMORANDUM 51

AERONAUTIC INSTRUCTION IN GERMANY.

By

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AERONAUTIC INSTRUCTION IN GERMANY.*

By

Henri Bouché.

The following is a list of the courses relating to aeronautics announced in Germany, both in the technical high schools and in the universities.

Technical High Schools.

In all these schools, excepting the one in Breslau, which is being reorganized, the technical student receives elementary aeronautical instruction and can elect special courses. We will indicate the relative importance of these courses by using the following abbreviations: C, course; E, practical exercises; H, hours per week; S, summer semester; W, winter semester.

Aerotechnics.

School	Subject	Lecturer
Aix-la-Chapelle	Introduction to flight technics (C, 2H, S, W).	Prof. Karman
Berlin-Charlottenburg	Elementary aerodynamics (C, 1H, W); Mechanics of airplanes (C, 1H, S).	Prof. Everling
	Equilibrium and general motion of airplanes (C, 2H, W).	Dr. Fuchs
Brunswick - - -	Flight principles and different airplane types (C, 1H, W; Aerostatics and aerodynamics:	Prof. Schlink

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	(C, 4H, E, 2H, S) (This course is part of the general scheme of a broad treatment of technical mechanics by Prof. Schlink).	
Dresden	Hydrodynamics and aerodynamics and their applications to the theory of flight (C, 2H, W; E, 1H, W, in a special class.	Prof. Foeppl
Hanover	Introduction to the statics of airplanes (C, 1H, S).	Prof. Oesterlen
	Aeromechanics (C, 1H, W).	Prof. Proell
Darmstadt	General course in aeronautics (C, 2H, S).	Prof. Eberhardt
Aix	General meteorology (C, 2H, S W).	Prof. Polis
Berlin	The science of the weather for engineers (C, 1H, W); Source measurement and utilization of the wind for technical purposes (C, 1H, S).	Prof. Kassner
Darmstadt	Aeronautic meteorology (C, 2H, W).	Prof. Linke, of Frankfort Un'y.
Karlsruhe	Meteorological practice (C, 1H; W); General meteorology (C, 2H, S).	Prof. Peppler
Munich	Meteorology and climatology (C, 2H, W).	Prof. Emden
Stuttgart	Measurement of barometric altitudes (C, 1H, W).	Prof. Hammer

Free Balloons.

Stuttgart	The free balloon and the construction of airships (C, 3H; S, W).	Prof. A. Baumann

Aeronautic Engines.

Berlin - - - -	Light internal combustion engines, aeronautic engines, airplane engines, (C, 2H, W, S).	Prof. Becker
	Aeronautic engines (C, 2H, S) (Prof. Romberg holds, in fact, the chair of marine gasoline engines. The recent change in his assignment is worthy of remark.)	Prof. Romberg

Airships.

Berlin - - - -	Airships (C, 2H, W).	Prof. Parseval
Dantzig - - - -	(Prof. Schuette lectures officially this year only on naval construction, but this apostle of the airship is a technical adviser for the youth of the university.)	
Darmstadt - - -	Aerial navigation by airship (C, 2H, W, S).	Prof. Eberhardt

Airplanes.

Berlin - - - -	Airplanes (C, 2H, S, W).	Prof. Parseval
	Practical exercises in airplane construction (E, 2H, W).	Profs. Parseval and Everling.
Dantzig - - - -	Airplane construction (C, 1H, S).	Prof. Rieppel
	Practice in airplane construction (C, 2H, W; 3H, S).	Instructor Gaul.
Darmstadt - - -	Technics of aeronautical construction (C, 2H, S; W).	Prof. Eberhardt
Hanover - - - -	Airplane construction (C, 2H, S).	Prof. Proell

Propellers.

Dantzig - - - -	Aerial and marine propellers (C, 2H, S, W; E, 2H, S, W).	Prof. Foettinger
Darmstadt - - -	Theory and calculation of aerial propellers (C, 2H, S, W; E, 2H, S, W).	Prof. Eberhardt

Instruments.

Berlin - - - - -	Gyroscopic instruments (C, 1H, W); Aerial navigation instruments (C, 1H, S).	Prof. Everling

Applications.

Darmstadt - - -	Aerial photo-topography (C, 2H, S, and 3 days practice on the field.)	Dr. Gasser

There are also departments of aeronautical technics, subsidized by the government, like the one over which Prof. Schlink presides at Brunswick, Prof. Schuette's laboratory at Dantzig, and Prof. Emden's Association of Aeronautical Technics at Munich. Lastly, a special mention should be made of the department for experiments on airplanes in flight, connected with the technical school at Hanover, the founding of which was due to the intelligent generosity of the "Hannoverische Waggonfabrik" which makes the Hawa airplanes.

Universities.

In Germany the plan which seems to prevail with regard to aeronautic instruction, is the following: The technical high schools produce aeronautical engineers while the universities are

expected to supply the future teachers, mathematicians, and physicists with general aeronautic knowledge, which will make them well-informed propagandists and "awakeners" of the youth.

It is therefore through the special attention given aeronautics in the broad general courses of mathematical and experimental physics, of atmospheric physics, of the theories and technics of machines and engines, of metallurgy, etc., that the future professors and scientists of Germany will be instructed.

The universities should, moreover, by means of special courses, produce aerodynamic and meteorological experts, fitted to continue the work of the Prandtls, Karmans and Betzes. At the University of Göttingen, there is already being developed, about Prandtl and his associates, a school for developing and transmitting aerodynamic knowledge.

Similar schools exist at Leipzig, with Otto Wiener; at Haller with Albert Wigand; at Hanover, with Gorrissen. Very soon, thanks to a vigorous campaign, all these 22 universities will assist in making a place for aeronautics in German science.

Let us call attention to the recent creation at Cologne, as an annex to the university, of an "Institute for the Study of Transportation," in which special attention will be given to aerial transportation.

The professors of the great German universities say that the methods of calculation in vogue in the technical courses are improved by their aeronautical application and that they constitute

intellectual gymnastics of great pedagogical value. They say that aeronautic technics have already reacted on the other branches of applied mechanics. Lastly, they express confidence in the future of aircraft.

The scientists and professors who speak thus are also Germans and believe in the greatness of Germany. Prof. Parseval wrote: "It is clear that, in the near future, our aeronautic construction, under the oppression of the Entente, will be insignificant and that we will have use in Germany for only a few trained engineers, but many students will be educated in aeronautics with the idea of carrying their knowledge to foreign countries."

Thus, without regard to our action, aeronautic instruction, as now being organized, assures to Germany:

1. A class of superior aeronautic technicians, educated in the universities in contact with the present scientists, whom they will succeed;

2. Many engineers of aeronautic construction, some of whom will be employed in the offices of research and the shops which Germany will still be able to retain, the exportation of the excess products creating markets for German industries;

3. Science teachers, who will attract the youth and keep up the interest in aeronautics.

We have no fear of this effort, which seems perfectly reasonable to us. In France there are technicians, professors and scientists who also wish to advance aeronautics. There is "L'Ecole

supérieure d'Aéronautique" where, under the direction of Colonel Roche, engineers are instructed by experienced specialists. There are the courses of Mr. Marchis at the Sorbonne, of Mr. Soreau at the "Arts et Métiers" and of Mr. Rothé at Strassburg. "L'Ecole supérieure des Travaux publics" has already established a course in aeronautics. Grenoble and Caen have given it a place in their curriculum. We hope every French university and technical school will give aeronautics the consideration it demands. If they have not already done so, we are confident that it will only be necessary to call the attention of the proper authorities to this great question.

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